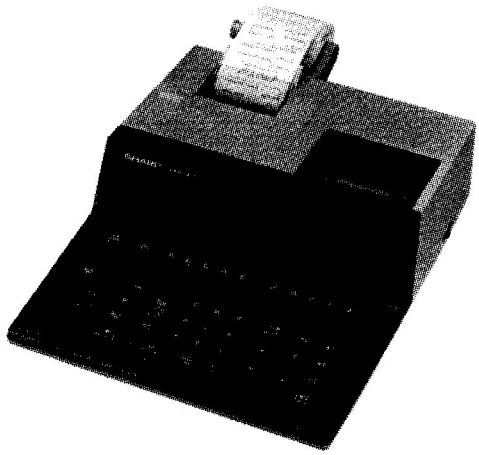
SHARP SERVICE MANUAL

CODE : 00ZZL6500DPME



DIAGNOSTIC P-ROM MANUAL

MODEL ZL-6500

TABLE

Parts code	Price rank	Description	
UKOGC1015CSZZ	BD	Test ROM ① (for machine based tests)	
UKOGC1016CSZZ	BD	Test ROM ② (for PWB based tests)	
QCNCM1304CC2F	BA	RS232C connector test	x 2pcs
–	–	CE650M (REPLACEMENT MODEL)	

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SHARP CORPORATION

1. GENERAL DESCRIPTION

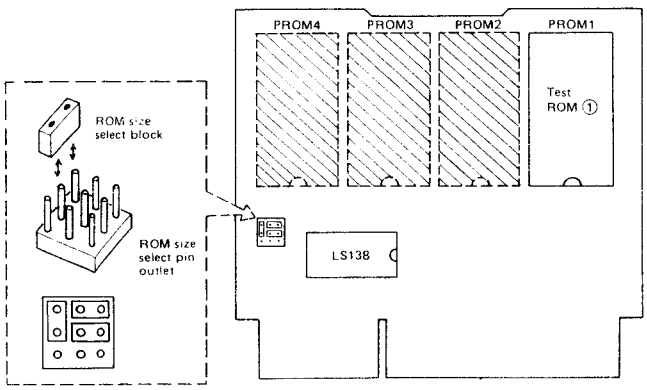
This diagnostic program has been provided for simple diagnoses of the hardware.
It has a choice of test modes; machine based tests and PWB based tests.

2. MACHINE BASED TESTS

2-1. Tools required

- CE-650M . . . . . PROM cartridge option
- UKOGC1011CSZZ . . . . Test ROM ① (for machine based tests)
- QCNCM1304CC2F . . . . RS232C connector test

2-2. Preliminary operation



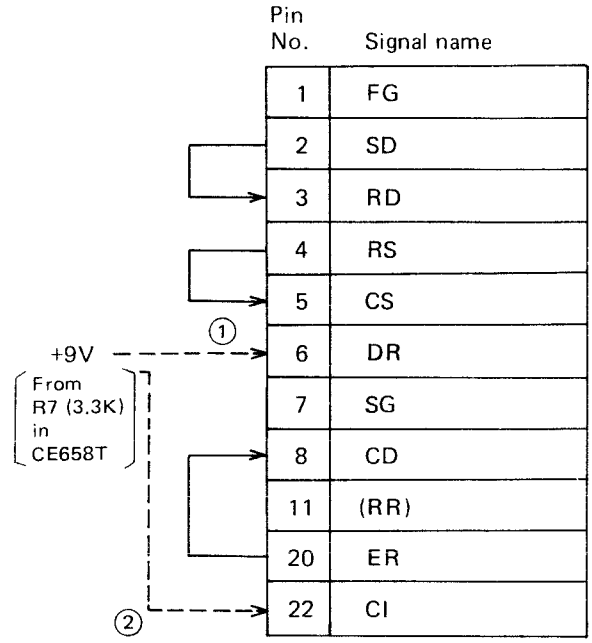
1) Remove two screws (XUPSM26P08000) that secure the CE-650M top cabinet with the bottom cabinet.
2) Remove the PWB unit from the cabinet and install the test ROM ① on the PROM1 socket. Make sure that the ROM size select block has been installed to the pin outlet as shown in the figure.
3) Replace the PWB unit back in the CE-650M and fasten the top cabinet with the bottom cabinet using two screws.
4) Open the cover of the ZL-6500 PROM cartridge and install the CE-650M on the given location (on the key side in front of the unit).

NOTE: In case the external alphanumeric keyboard (IBM PC type), RAM cartridge (CE-651M or 652M), and RS232C interface (CE-658T) have to be tested, type must be interfaced to the ZL-6500.

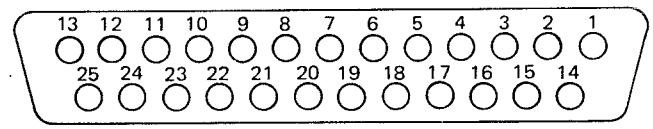
5) Leave the PROM sockets, 2 thru 4, open.
6) In case the RS232C interface has to be tested in the loopback test mode, the pins of the RS232C interface test connector must be shorted as described next.

RS232C interface loopback test connector schematic

- Shown below is the schematic for connection of the RS232C loopback test connector.
  The connector is needed for both channels A and B, respectively.



Connector used: DB-25, male



① : For test of DR signal
② : For test of CI signal
} Connected (ON): high level
Unconnected (OFF): low level

DB-25M I/O pin signal level

Input signal	H	+3 ~ +15V
	L	−3 ~ −15V
Output spignal	H	+5 ~ +12V
	L	−5 ~ −12V

2-3. Kinds of tests

0) ROM test
- System ROM, (ROM version No. is printed)
- Spare ROM, (ROM version No. is printed)

1) RAM test
- System RAM
- Expansion RAM

2) Display test
- Display controller
- Display tube

3) Printer test
- Printer controller
- Printer

4) Key/slide switch tests
- Key controller
- All keys and all slide switch tests

5) LED and buzzer tests

6) RS232C interface test
- SIO
- CTC

7) PROM cartridge test

8) RAM cartridge test

9) Cartridge cover test

A) Baud rate select switch test

B) RAM cartridge read test

The intermediate and final test results are displayed on the display unit and printed on the printer with this test. It becomes impossible to know the test results if the printer and the display unit are not properly functioning.

In case no message is displayed after the start of the test operation, it may be due to one of the following conditions.

1. Z-80A Microprocessor failure
2. Touch or open line in the address bus
3. Touch or open line in the data bus
4. PCU, DCU, or KCU failure
5. ROM or RAM No.1 failure
6. Power supply failure
7. Failure in the bus buffer and its peripheral circuit (74LS (74LS244, 74LS245, 74LS367, 74LS00)
8. Failure in the address decoder (74LS138)
9. Failure in the clock generator (EXO-2) signal buffer (74LS04), or oscillator (CSA6.00MG)

2-4. Start of test

To start the test, set all slide switches (PRT, ↑ , K, MODE-5, DEC-F) up, and turn power on with the [3] key depressed in conjunction with the [7] key.
With this, the following will be displayed and printed.

Fig. 2

```
ZL-6500 DIAGNOSTIC V1.2
TEST: 1) CYCLE   2) ITEM
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1) CYCLIC TEST: Test items, 0) thru 9), are tested successively.

2) ITEM TEST: Test items, 0) thru B), may be tested individually.

CAUTION: Never remove the PROM cartridge in the middle of the test operation. The power must be turned off before the removal of the PROM cartridge.

2-5. Overall tests

Press the [1] key to start the overall tests.

Test sequence and procedure will be discussed in the following.

NOTE: Noted with a block ■ indicates the comment.

- ■ If the [RE SET] key is pressed in a middle of continuing test operation, the test then terminates and the control returns to the diagnostic menu.
- ■ If the power switch-off in the diagnostic menu, the mode of the diagnostic operation is cancelled and the control returns to the ordinary mode.
- ■ If the [SHIFT] key is pressed in a middle of continuing test operation, the currently executing test is skipped and the control jumps to a next test item.

Key operation	Display	Printout
• Press the [3] key in conjunction with the [7] key with all slide switches in UP position, • Turn power on.	AL-6500 DIAGNOSTIC V1.2 TEST: 1) CYCLIC 2) ITEM ■ Diagnostic item select mode	ZL-6500 DIAGNOSTIC V1.2 (RED PRINTED) TEST: 1) CYCLIC 2) ITEM
Press the [1] key	■ The overall tests start.	
■ ROM test • System ROM • Spare ROM	ROM TEST START ROM NO.1 OK ROM1 version message is displayed. ROM NO.2 OK ROM2 version message is displayed. ROM TEST END ■ ROM is tested using checksum. Both the system ROM and the spare ROM are tested using the checksum. The system ROM is identified as the ROM No.1 and the spare ROM as the ROM No.2. ■ If a failure is met in the ROM, the result is issued on the display and the printer, and the test is terminated. (When the ROM No.1 is in failure) ROM NO.1 FAULT (When the ROM No.2 is in failure or not inserted on the socket) ROM NO.2 FAULT	ROM TEST START ROM NO.1 OK ROM1 version message is printed. (*1) ROM NO.2 OK ROM2 version message is printed.(*1) ROM TEST END (When the ROM No.1 is in fault) ROM NO.1 FAULT (When the ROM No.2 is in failure or not inserted on the socket) ROM NO.2 FAULT
■ RAM TEST	RAM: 1) KEEP 2) NOT KEEP ■ Either one of the following modes must be chosen before the RAM test. 1) KEEP ... RAM contents retention mode 2) NOT KEEP ... RAM contents non-retention mode Test data are written and read for the RAM test. In the retention mode, repeated write to another address can not be checked but only checked in terms of byte so as to allow save and restore of the existing data. But, in the non-retention mode, it checks repeated write to another address so that the existing data are lost.	RAM: 1) KEEP 2) NOT KEEP
Press the [1] key.	■ As the [1] key is depressed, the test takes place with the retention mode being established.	

Version message	System ROM part code	Model	
"ZL-L. (CAAOA)12/09/85"	VHI27256CAAOA	ZL-6500V (KV2)	ROM1
"Z-CODE I. (CABOB)07/24/86"	VHI27256CABOB	Except ZL6500 (KV2)	
"DOWN-LOAD (CAB1A)03/29/86"	VHI2764KCABIA	CE659	ROM2

Key operation	Display	Printout
Press the [2] key.	■ As the [2] key is depressed, the test takes place with the non-retention mode being established.	
	RAM TEST START	RAM TEST START
	RAM NO.1 OK	RAM NO.1 OK
	RAM NO.2 OK	RAM NO.2 OK
	RAM NO.1 OK (*1)	RAM NO.1 OK (*1)
	RAM TEST END	RAM TEST END
	■ Both the system RAM and the option RAM are tested. The system RAM is identified as the RAM No.1 and the option RAM as the RAM No.2. ■ If a failure is met in the RAM, the result is issued on the display and the printer, and the test is terminated.	
	(When the RAM No.1 is in failure)	(When the RAM No.1 is in fault)
	RAM NO.1 FAULT	RAM NO.1 FAULT
	(When the RAM No.2 is in failure or not inserted on the socket)	(When the RAM No.2 is in failure or not inserted on the socket)
	RAM NO.2 FAULT	RAM NO.2 FAULT
	■ (*1) is displayed and printed only in the non-retention mode. If repeated write is done between the RAM No.1 and RAM No.2, the following is displayed and printed.	
	RAM NO.1 FAULT	RAM NO.1 FAULT
■ Display test	DISPLAY TEST START	DISPLAY TEST START
	■ The following items, ① thru ⑦, are displayed repeatedly one at a time. (① → ② → ..... → ⑦) ① The display columns are alternately filled with dots or are blank. ② Above ① is displayed in reverse video. ③ displayed in all columns. ④ displayed in all columns. ⑤ displayed in all columns. ⑥ displayed in all columns. ⑦ ≪ : à ì ù è : á í ú é : ä ï ü ë : ∞ ÷ Ä Ë a: ≫ or ⑦ : : : : :	■ First, the DCU (Display Control Unit) is tested. If a failure is met, the results is printed and the test terminates. If the DCU is in failure, one of the following is printed. DISP ACK IS HIGH ERR DISP CNTLER DIES (Area with alphabetic font DMD) (Area without alphabetic font DMD)
Press the [SHIFT] key.	■ With the depression of the [SHIFT] key, the repeated displaying of items, ① thru ⑦, is terminated to end the display test.	
	DISPLAY TEST END	DISPLAY TEST END

Key operation	Display	Printout
■ Printer test	PRINTER TEST START ■ First, the PCU (Printer Control Unit) is tested. If a failure is met, the result is displayed and the test terminates. (Either one of the following is displayed when a failure is met in the PCU.) PCU FAULT (BUSY) PCU FAULT (PRINTER) PCU FAULT (IBF/ACK) PRINTER TEST END Note: If the jumper switching EXT K/B specifications by country are set to Germany, France, nad the U.K., alphabetic letters are also printed.	PRINTER TEST START ■ HHHHHHHHHHHHHHHHHHHHHHHH <<<<<<<<<<<<<<<<<<<<<<<<<<<< RED RED RED RED RED RED 0123456789:;<=>?@ABCDEFG HIJKLMNOPQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvw xyz{|}~@ PRINTER TEST END ■ One of the following, 1 thru 6 , is printed. 1 All dots are printed on the entire printing line. 2 ";H" printed on the entire printing line. 3 "<" printed on the entire printing line. 4 RED RED RED RED RED RED printed in red ink. 5 The entire character set printed. 6 The entire character set printed in the double size.
■ KEY/SL-SW tests	KEY/SL-SW TEST START ■ First, the KEY/SL-SW/LED/BUZZER controller is tested. If a failure is met, the result is displayed and printed, and the test terminates. (One of the following is displayed and printed when a failure is met. KEY ERR! ERR LINE = HIGH KEY RCV ERR! PARITY ERR ■ The key and slide switch must be pressed in the following sequence. The key and slide switch to be depressed next are displayed. (Slide switch must be set down.) Start 1 2 3 4 5 6 7 8 9 10 11 12 41 37 38 39 40 34 35 36 30 31 32 33 26 27 28 29 22 23 24 25 20 21 17 18 19 13 14 15 16 End	KEY/SL-SW TEST START KEY ERR! ERR LINE = HIGH KEY RCV ERR! PARITY ERR

Key operation	Display	Printout
■ KEY/SL-SW tests	■ If a wrong key or slide switch is selected, the test will not advance to the next step. The correct key or slide switch must be activated for the test to continue. ■ If there is a failure in the key or slide switch, the test will not advance without prompting a key depression or slide switch setting.	
	EXT K/B TEST START	EXT K/B TEST START
	■ key entry on the external keyboard is prompted. Entry of the key can be confirmed on the display.	
Press the [SHIFT] key	LNG. MODE JUMPER (XXX)	LNG, MODE JUMPER (XXX)
	Setting of the soldered jumper pad for switching EXT R/B specifications by country on the back of the KEY PWB is displayed and printed. Either U.S.A., GERMANY, U.K., FRANCE, on JAPAN is displayed and printed.	
Press the [↑] key.	■ With the depression of the [↑] key, the current key and slide switch tests are skipped and the nest key and slide switch can then be tested When the setting of specifications without the [000] key is used, "PUSH (000) KEY" is prompted. In this case, skip with the [↑] key and go to the next key. (forward).	
	KEY/SL-SW TEST END	KEY/SL-SW TEST END
■ LED/BUZZER test	LED/BUZZER TEST START	LED/BUZZER TEST START
	■ LEDs on the keyboard are activated from the left one at a time, and the buzzer activates a single beep at the end.;	
	LED/BUZZER TEST END	LED/BUZZER TEST END
■ RS232C I/F test	RS232C TEST START	RS232C TEST START
	■ Connection of the RS232C interface board (CE-658T) is checked. If not interfaced, the test terminates with the following display and print out.	
	NO RS232C I/F BOARD	NO RS232C I/F BOARD
	■ Now, the interface board dip switch positions and the signal level on the DRA, CIA, DRB, CIB terminals are displayed and printed.	
	BAUD RATE SW IS 11110010 (*2)	BAUD RATE SW IS 11110010 (*2)
	■ (*2) indicates the following:	

DRA	CIA	DRB	CIB	DIP SW			
				4	3	2	1
High ..... 0 Low (or NC) 1				ON ... 0 OFF ... 1			

	■ Next, the CTC (for baud generator) is tested.	
	CTC TEST START	CTC TEST START
	(When the CTC is in failure)	
	CTC FAULT	CTC FAULT
	(When OK)	
	CTC TEST END	

Key operation	Display	Printout
	■ As the loopback test connector is connected to the channels, A and B, the data transfer is tested in the loopback mode for each channel. The loopback test connector must be connected before the start of the test. (See 2-2, for the connection method.) ■ Channel A loopback test (When OK)	
	RS232C CH A OK	RS232C CH. A OK
	(When a failure is met, one of the following is displayed and printed.)	
	RS232C CH.A DATA ERROR	RS232C CH.A DATA ERROR
	RS232C CH.A FRAMING ERR	RS232C CH.A FRAMING ERR
	RS232C CH.A OVERRUN ERR	RS232C CH.A OVERRUN ERR
	RS232C CH.A PARITY ERR	RS232C CH.A PARITY ERR
	RS232C CH.A SIO ERROR	RS232C CH.A SIO ERROR
	(When the loopback connector is not in connection)	
	RS232C CH.A NON CONNECT	RS232C CH.A NON CONNECT
	■ Channel B loopback test Similar as the channel A test.	
	RS232C TEST END	RS232C TEST END
■ PROM cartridge test	ROM CARTRIDGE TEST START	ROM CARTRIDGE TEST START
	■ The checksum is obtained for the data in the PROM for each 8KB bank (0 to 15), and results are displayed and printed.	When no ROMs are mounted in the PROM sockets, 2, 3, and 4, the checksum for the banks 4 through 15 will result in 00. For the test ROM 1 is mounted in the PROM socket 1, the checksum test is carried out for each bank, in total of four banks (8KB x 4).
	BANK 0 CHECKSUM: 50	BANK 0 CHECKSUM: 50
	BANK 1 CHECKSUM: 51	BANK 1 CHECKSUM: 51
	BANK 2 CHECKSUM: 52	BANK 2 CHECKSUM: 52
	BANK 3 CHECKSUM: 53	BANK 3 CHECKSUM: 53
	BANK 4 CHECKSUM: 00	BANK 4 CHECKSUM: 00
	BANK 15 CHECKSUM: 00	BANK 15 CHECKSUM: 00
	ROM CARTRIDGE TEST END	ROM CARTRIDGE TEST END
	■ NOTE: BANK 0 CHECKSUM 50 BANK 1 CHECKSUM 51 BANK 2 CHECKSUM 52 BANK 3 CHECKSUM 53 — Checksum is obtained for the test ROM 1 which is mounted on the ROM socket 1, and the results will be displayed and printed. BANK 4 CHECKSUM 00 BANK 5 CHECKSUM 00 BANK 6 CHECKSUM 00 BANK 7 CHECKSUM 00 — Checksum is obtained for each 8KB PROM mounted on the ROM socket 2, and the results will be displayed and printed.	

Key operation	Display	Printout
• PROM cartridge test	BANK 8 CHECKSUM 00 BANK 9 CHECKSUM 00 BANK 10 CHECKSUM 00 BANK 11 CHECKSUM 00 } Checksum is obtained for each 8KB PROM mounted on the ROM socket 3, and the results will be displayed and printed. BANK 12 CHECKSUM 00 BANK 13 CHECKSUM 00 BANK 14 CHECKSUM 00 BANK 15 CHECKSUM 00 } Checksum is obtained for each 8KB PROM mounted on the ROM socket 4, and the results will be displayed and printed.	
■ RAM cartridge test	RAM CARTRIDGE TEST START	RAM CARTRIDGE TEST START
	■ First, proper mounting of the RAM cartridge (CE-651M/CE-652M) is checked. If not mounted, the test terminates with the following message on display.	
	NO RAM CARTRIDGE	NO RAM CARTRIDGE
	■ Next, closing of the cartridge cover is checked. If not closed, the following message is displayed and you must respond by closing the cover.	
	CLOSE THE COVER	(No printout produced)
	■ RAM in the RAM cartridge is divided into four 8KB banks of 0 thru 3, and each bank is write/read tested one at a time. If no failure was met, the number of the respective bank is displayed and printed with an OK sign.	
	BANK 0 CHECK OK	
	■ If a failure was met, the following message is immediately displayed and printed and the test terminates.	
	Ex-1: (When a failure is met in the bank 1 while the bank 0 is free of failure)	
	BANK 0 CHECK OK	BANK 0 CHECK OK
	RAM CARTRIDGE ERROR	RAM CARTRIDGE ERROR
	Ex-2: (When a failure is met in the bank 3, while banks, 0, 1, and 2 are free of failure)	
	BANK 0 CHECK OK	
	BANK 1 CHECK OK	
	BANK 2 CHECK OK	
	RAM CARTRIDGE ERROR	
	■ For the CE-651M (8KB) RAM cartridge, the test terminates with the Ex-1 message displayed and printed, when the cartridge test has been successful, Since banks, 1, 2, and 3 do not exist for the CE-651M which is an 8KB chip. ■ In the case of the CE-652M (32KB), the read test is conducted after completion of the write/read test from bank 0 to bank 3 to do the repeated write test among chips. Note that the contents of the RAMs are destroyed. (When OK)	
	BANK 0 CHECK OK	BANK 0 CHECK OK

Key operation	Display	Printout
	(When repeated write is found) RAM CARTRIDGE ERROR RAM CARTRIDGE TEST END NOTE: (When the 8KB CE-651M test is successful) BANK 0 CHECK OK RAM CARTRIDGE ERROR RAM CARTRIDGE TEST END When the 32KB CE-652M test is successful BANK 0 CHECK OK BANK 1 CHECK OK BANK 2 CHECK OK BANK 3 CHECK OK } Write/read test results BANK 0 CHECK OK BANK 1 CHECK OK BANK 2 CHECK OK BANK 3 CHECK OK } Read test results RAM CARTRIDGE TEST END The above is displayed and printed.	RAM CARTRIDGE ERROR RAM CARTRIDGE TEST END
■ Cartridge cover test	CART COVER TEST START OPEN THE COVER ■ First, the cover open state is checked. After the cover opens, the control then moves to the next step. If a failure is met, the control would not move to the next step. CLOSE THE COVER ■ Now, the cover close state is checked. After the cover closes, the test terminates. If a failure is met, the test would not terminate. CART COVER TEST END	CART COVER TEST START OPEN THE COVER CLOSE THE COVER CART COVER TEST END

(Display and printout return to diagnostic item select mode after the cartridge cover test.)

2-6. Individual test

When the [2] key is pressed in the diagnostic menu, the individual test mode is established. The desired test item can be chosen in this mode.
The following describes the operational procedure.

Key operation	Display	Print out
• Press the [3] key in conjunction with the [7] key with all slide switch at UP position. • Turn power on. ■ Diagnostic item select mode	ZL-6500 DIAGNOSTIC V1.2 TEST: 1) CYCLIC 2) ITEM	ZL-6500 DIAGNOSTIC V1.2 (RED PRINTED) TEST: 1) CYCLIC 2) ITEM
Press the [2] key. ■ Test item select mode	■ Test item selection 0) ROM 1) RAM ... ① 2) DISPLAY 3) PRINTER ... ② 4) KEY/SL-SW 5) LED/BUZZER ... ③ 6) RS232C 7) ROM CART. ... ④ 8) RAM CART. 9) CART. COVER ... ⑤ A) B/R SW B) RAM-C READ ... ⑥ C) LNG.JUMPR D) PRINTER: EU ... ⑦ Above items, ① thru ⑦, are displayed alternately.	0) ROM 1) RAM 2) DISPLAY 3) PRINTER 4) KEY/SL-SW 5) LED/BUZZER 6) RS232C 7) ROM CART. 8) RAM CART. 9) CART. COVER A) B/R SW B) RAM-C READ C) LNG.JOMPR D) PRINTER: EU (Printout is produced only once)
Press one of [0] to [D] keys.	■ As one of [0] thru [D] keys is pressed in the test Item select mode, the respective test item is chosen to execute that particular test. Test items [1] thru [9] are identical to the cyclic test. Description will be given later for the test items, [A] ~ [D]. ■ When the individual test has been completed, the control then returns to the test item select menu.	
Press the [RE SET] key.	■ When this key is pressed the a middle of the individual test execution or in the test item select mode, the control then returns to the diagnostic menu.	
Press the [SHIFT] key.	■ When this key is pressed the a middle of an individual test execution, the test then terminates. Then, the control returns to the test item select menu.	
■ Test conducted with the [A] ~ [D] key. (It is not applicable in the cyclic test items, but can be applicable in the individual test mode.) ■ For continuous displaying of the baud rate setup dip switch and DR and CI lines. Press the [A] key.	BAUD RATE SW IS 11110010 (*2)	

Key operation	Display	Printout
	■ The state of the RS232C interface test dip switch and the level of the DRA, CIA, DRB, and CIB terminals are continuously displayed. They are displayed in the same manner as the RS232C interface test. ■ Used to test action of the dip switch and DRA, CIA, DRB, and CIB lines. ■ The test will be executed continuously until the [RE SET] or [SHIFT] key is depressed.	
■ RAM cartridge read test Press the [B] key.	RAM CARTRIDGE READ TEST ■ The RAM cartridge read test is conducted. After the completion of the test with the [8] key, data of the specific pattern are retained in the RAM cartridge. In this test, any change in the data pattern is tested. ■ Used to test the data backup circuitry in the RAM cartridge. After the completion of the test with the [8] key, the RAM cartridge has to be removed and inserted once again. Then, the depression of the [B] will check for affected data and erased data.	RAM CARTRIDGE READ TEST BANK 0 CHECK OK RAM CARTRIDGE ERROR (When 8KB used)
	LNG . MODE JUMPER (XXX) • Setting status of the jumper pad for switching EXT K/B specifications by country is printed. Either U.S.A., GERMANY, FRANCE, U.K., or JAPAN is shown in ( ).	
	PRINTER TEST (EU.) START • Regardless of which jumper pad for switching EXT K/B specifications by country is used, characters including alphabetic letters are printed.	PRINTER TEST (EU.) START ■■■■■■■■■■■■■■■■■■■■■■■ HHHHHHHHHHHHHHHHHHHHHHH <<<<<<<<<<<<<<<<<<<<<<<< RED RED RED RED RED RED !"#$%&'()*+,-./ 0123456789:;<=>?@ABCDEFG HIJKLMNOPQRSTUVWXYZ[\]^_ `abcdefghijklmnopqrstuvw xyz{|}~@PÜéÄäåÅÉæÆîÏìÄÅ ÉæÆôöòÛÙÿÖÜ¢£¥₧ƒáíóúÑÑªº ¿⌐¬½¼¡«»ΩΓπΣσμτΦΘΩδ∞φΕΠ PRINTER TEST END

2-7. Troubleshooting

When an error is encountered during the diagnostic test, the cause must be traced in accordance with the following item. The items provided do not cover all causes, but can serve as a guide to trace the trouble cause.

Error message or trouble symptom	
ROM NO.1 FAULT	• Failure in the system ROM (27256) • Failure in the A15 or A15' signal line (open line or line touch)
ROM NO.2 FAULT	• The spare ROM (2764) not mounted (not a failure) • Failure in the spare ROM (2764) • Failure in the address decoder (74LS138) • Failure in the $\overline{\text{ROMM}}$ signal line (open line or line touch)
RAM NO.1 FAULT	• Failure in the RAM1 (TC5565) • Failure in the address decoder (74LS138) • Failure in the $\overline{\text{RAM1}}$ signal line • Failure in the VB circuitry (peripheral of 2SA673A)
RAM NO.2 FAULT	• The RAM option (RAM2) not mounted (not a fault) • Failure in the expansion RAM (RAM2) • Failure in the $\overline{\text{RAM2}}$ signal line. • Failure in the VB circuitry (peripheral of 2SA673A)
DISP ACK IS HIGH ERR DISP CNTLER DIED	• Failure in the DCU (HD614048FD12) • Failure in the DCU ceramic vibrator (CSA6.00MG) • Failure in the 8255 • Failure in the display PWB connector or cable • Failure in the REQD inversion circuitry (JC501)
Existence of an inactive dot when all display dots are driven	• Failure in the character generator (LI-2049) • Open display tube segment
When a part of display segments does not activate	• Open display tube grid • Failure in the grid driver (IR2C05) • Failure in the DCU g1 thru g13 signal lines.
A faint activation of the dot to be inactive	• Failure in the DCU FCUT signal line. • Failure in the power supply PWB failament cut circuitry • Failure in the power supply PWB VNG voltage
When the display contets is at fault	• Failure in the character generator (LI2049) • Connection failure between the DCU and the character generator • Failure in the –4V line.
PCU FAULT (BUSY) PCU FAULT (IBF/ACK) PCU FAULT (PRINTER)	• Failure in the PCU • Failure in the PCU clock signal "ϕPCU" • Failure in the $\overline{\text{IR}}$·$\overline{\text{IW}}$ signal line • Failure in the address decoder (74LS138, main board) • Failure in the $\overline{\text{PCU}}$ signal line.
PCU FAULT (PRINTER)	• Failure in the printer itself (motor, main solenoid, home switch, or dot signal) • Failure in the printer motor control circuitry (VP circuit) • Failure in the dot signal waveform shaping circuitry (JA101, main PWB Q4 periphery) • Failure in the printer connector or cable
Do not print in red	• Failure in the printer itself (color select solenoid) • Failure in the color select solenoid driver (M54567, IC20) • Failure in the PCU $\overline{\text{CC}}$ signal line • Failure in the printer connector or cable
KEY ERR! ERR LINE = HIGH KEY RCV ERR! PRITY ERR	• Failure in the KCU (HD614048FD11) • Failure in the KCU ceramic vibrator (CSA.00MG) • Failure in the 8255 • Failure in the key PWB inverter (40H004) • Failure in the key PWB connector or cable
Failure in key or slide switch action	• Open or touch in the key signal line • Slide switch rubber roller disengagement • Dirt or foreign matter within the key

Error message or trouble symptom	
LED does not activate	• Failure in the LED • Failure in the KCU • Failure in the LED driver transistor (JC501, key PWB Q2, Q3)
Buzzer does not sound	• Failure in the buzzer • Failure in the buzzer drive circuitry (JC501, key PWB Q1 periphery)
NO RS232C I/F BOARD (If the above message was displayed even though the interface PWB is mounted.)	• Failure in the $\overline{\text{IFEX}}$ signal (8255)
BAUD RATE SW IS XXXXXXXX (If does not match with the dip switch setting.)	• Failure in the 74LS244 or 74LS32 of the interface PWB • Failure in the address decoder (74LS138), main PWB • Failure in the $\overline{\text{BRSW}}$ signal line • Failure in the dip switch
BAUD RATE SW IS XXXXXXXX (If does not match with the DRA, CIA, DRB, CIB level.)	• Failure in the 74LS244 or 74LS32 of the interface PWB • Failure in the address decoder (74LS138), main PWB • Failure in the $\overline{\text{BRSW}}$ signal line • Failure in the 75189A (IC6) of the interface PWB
CTC FAULT	• Failure in the time base EX0-2 (interface PWB, IC3) • Failure in the CTC • Failure in the IE1 or $\overline{\text{INT}}$ signal line • Failure in the ϕCTC signal line • Failure in the 74LS32 of the interface PWB
RS232C CH. A or B DATA ERROR FRAMING ERROR OVERRUN ERR PARITY ERR SIO ERROR RS232C CH. A OR B NOT CONNECT (If the above message was displayed when the loopback connector is used.)	• Failure in the SIO • Failure in the dc-dc converter circuit (on the interface PWB) • Failure in the 75188 or 75189A (IC7 – 10, interface PWB) • Failure in the CN2 and CN3 (interface PWB) signal line • Failure in the L1 thru L20 • Failure in the loopback connector
The sum of thr PROM differs from the sum on the display and printout	• Failure in the address decoder (74LS138, memory PWB) • Failure in the $\overline{\text{CAR}}$ signal line • Failure in the card edge connector • Failure in the $\overline{\text{MR}}$ signal line • Failure in the PIO • Failure in the PIO B0 thru B7 signal lines • Failure in the address decoder (74LS138) of the PROM cartridge • Failure in the ROM size select block
NO RAM CARTRIDGE (If the above message was displayed even though the RAM cartridge is installed.)	• Failure in the PIO • Failure in the RAM cartridge card edge connector
RAM CARTRIDGE ERROR	• Failure in the PIO • Failure in the $\overline{\text{CARB}}$, $\overline{\text{MRB}}$, or $\overline{\text{MWB}}$ signal line • Failure in the $\overline{\text{CB0}}$ or $\overline{\text{DIRB}}$ signal line • Failure in the bus buffer, 40H244 or 245 • Failure in the 74LS32 (IC7) • Failure in the VB circuitry (2SA673A, memory PWB) • Failure in the $\overline{\text{RESB}}$ signal line • Failure in the RAM cartridge
CLOSE THE COVER OPEN THE COVER (If the above message was displayed when the state of the cartridge cover is indicated differently.)	• Failure in the photo-sensor • Failure in the sensor connector or cable • Failure in the PIO • Damage on the sensor protrusion of the cover • Dirt or foreign matter in the photo-sensor

2-8. System ROM and spare ROM checksum

For the checksum used in the diagnostic test, the sum of the ROM written in the specific address of the ROM is compared with the sum that obtained after calculation.
System ROM ... 7FF9H: Stores the checksum from 0000H to 7FFFH.
Spare ROM ... 9FFFH: Stores the checksum from 8000H to 9FFFH.
(The checksum itself is included in the checksum.)

3. PWB BASED TESTS

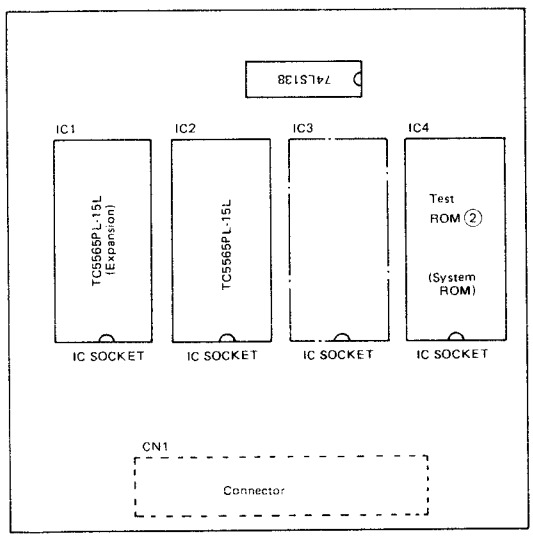
3-1. Tools required

- UKOGC1012CSZZ ... Test ROM ② (for the PWB based test)

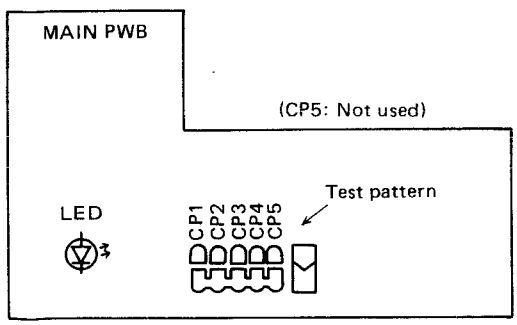
3-2. Preliminary operation

It is not possible to test the machine in the machine based test model, if the display PWB has in trouble.
In such event, the test can be carried out in this mode. Trouble symptom will be verified on the LEDs of the main PWB.

1) Replace the system ROM (27256, IC4) inserted on the memory PWB with the test ROM ②. See the figure below.



2) Choose and short the test pins on the main PWB according to the desired test item.



1 RAM test ... Short the pattern CP1.
2 Display test ... Short the pattern CP2.
3 Printer test ... Short the pattern CP3.
4 Key test ... Short the pattern CP4.
5 DEBUG CARTRIDGE (CE659) test
. . . . . short the pattern CP5.

NOTE: All pattern no shorting:
Same as machine based test. But, RAM contents non-retention. ROM version is not displayed and Printed.

3-3. Kinds of tests

When the power is turned on after the above preparation, the test takes place.

- The test result is indicated on an LED.
  a) The LED blinks during the test, and it comes to activate when the test has been successful.
  b) Continued activation or deactivation of the LED after the power on means there is a failure.
  c) Continued blinking of the LED indicates that there is a failure.
  NOTE: Judge the proper function by the activation or deactivation of the LED in reference to the LED activation and deactivation timings.

1) RAM test
RAM write/read test is conducted.
The contents of the RAM are destroyed. The option RAM will not be tested.

2) Display test
The display controller is tested first. Then the display contents, 1 thru 7 discussed in the machine based test, are displayed repeatedly.

3) Printer test
The printer controller is tested first. Then, the printout contents, 1 thru 7 discussed in the machine based test, are displayed repeatedly. (Europe font is not printed.)

4) Key test
The key controller is tested first. Then, when any key is depressed, the LED blinks off/on.
- Failure in the RAM: Non test 2) ~ 4).

5) Debug Cartridge (CE659) test

(1) Insert the debug cartridge into the slot of the P-ROM cartridge and start the test (i.e., POWER ON).

(2) DEBUG-C. TEST 1) R/W 2) RD is printed.

(3) Depress the key [2].

DEBUG-C. R/W TEST START

(4) All data of each bank is written and read, and the test is performed.
If the result is OK,

BANK n CHECK OK!

is printed. (n=0 to 15 are tested sequentially.)

(5) DEBUG-C. READ TEST START

Read only test is performed successively.

(6) If the result is OK, is printed.

BANK n CHECK OK!

(n=0 to 15 are tested sequentially.)

(7) DEBUG-C. TEST END

is printed and displayed, and the test is completed.

- If an error appears during the test,

DEBUG-C ERROR!!! is printed and the test is completed. (Subsequent tests are not performed.)

- When the [2] key is depressed in (3), sequences (5) ~ (7) only are executed.
- With the depression of the reset switch of the DEBUG CARTRIDGE during the test, the system is reset equivalent to resupply of power), and the sequences after (2) are performed. By this, the operation of the reset switch of the DEBUG CARTRIDGE can be confirmed.

```
DEBUG-C. TEST 1)R/W 2)RD
DEBUG-C. R/W TEST START
 BANK 0 CHECK OK!
 BANK 1 CHECK OK!
 BANK 2 CHECK OK!
 BANK 3 CHECK OK!
 BANK 4 CHECK OK!
 BANK 5 CHECK OK!
 BANK 6 CHECK OK!
 BANK 7 CHECK OK!
 BANK 8 CHECK OK!
 BANK 9 CHECK OK!
 BANK10 CHECK OK!
 BANK11 CHECK OK!
 BANK12 CHECK OK!
 BANK13 CHECK OK!
 BANK14 CHECK OK!
 BANK15 CHECK OK!
DEBUG-C. READ TEST START
 BANK 0 CHECK OK!
 BANK 1 CHECK OK!
 BANK 2 CHECK OK!
 BANK 3 CHECK OK!
 BANK 4 CHECK OK!
 BANK 5 CHECK OK!
 BANK 6 CHECK OK!
 BANK 7 CHECK OK!
 BANK 8 CHECK OK!
 BANK 9 CHECK OK!
 BANK10 CHECK OK!
 BANK11 CHECK OK!
 BANK12 CHECK OK!
 BANK13 CHECK OK!
 BANK14 CHECK OK!
 BANK15 CHECK OK!
DEBUG-C. TEST END
```

NOTE: The LEDS, Buzzer, and Slide Switches cannot be tested in this mode.

3-3-1. Timings